Harvesting Energy from the Forest: New Technology, New Opportunities?

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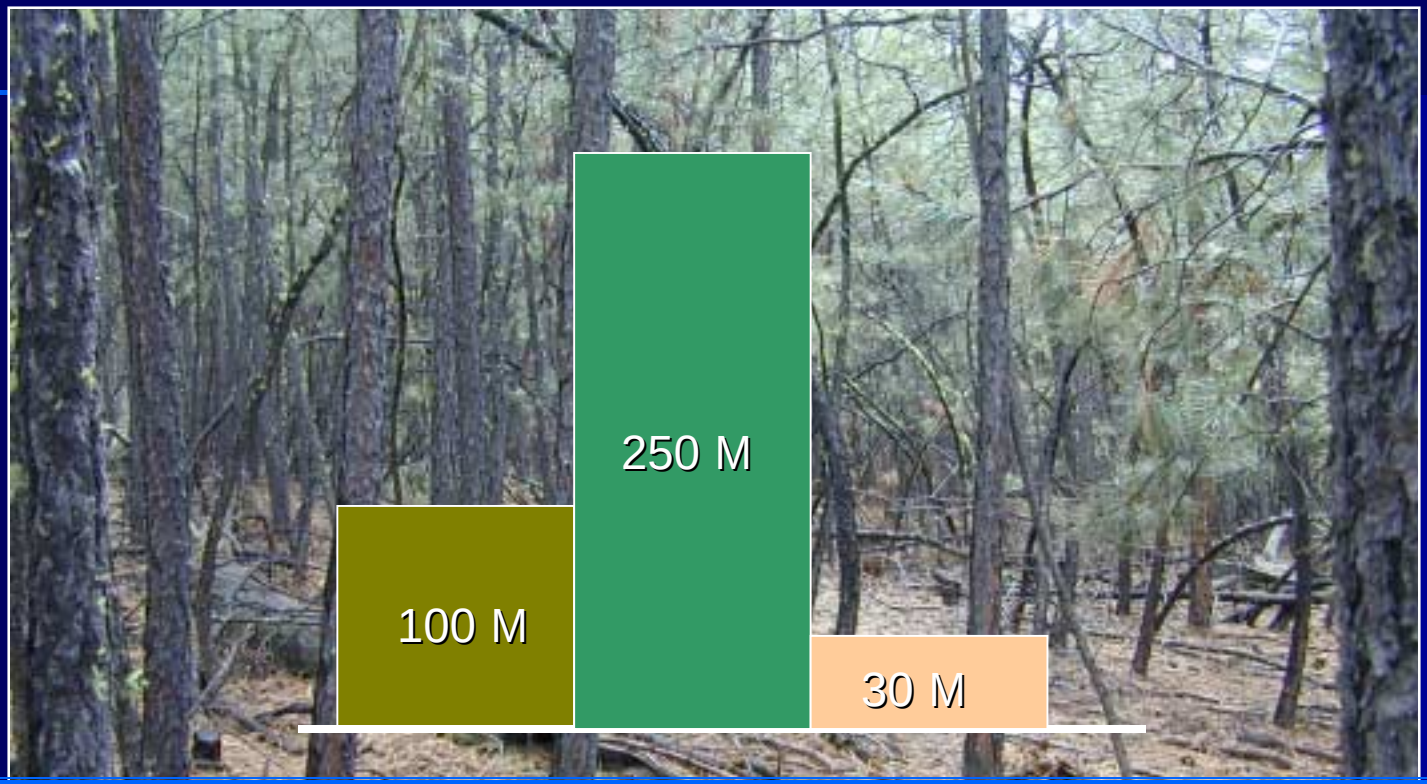
A big problem



- Strategic Assessment of Forest Biomass and Fuel Reduction Treatments in the West (www.fs.fed.us/research)

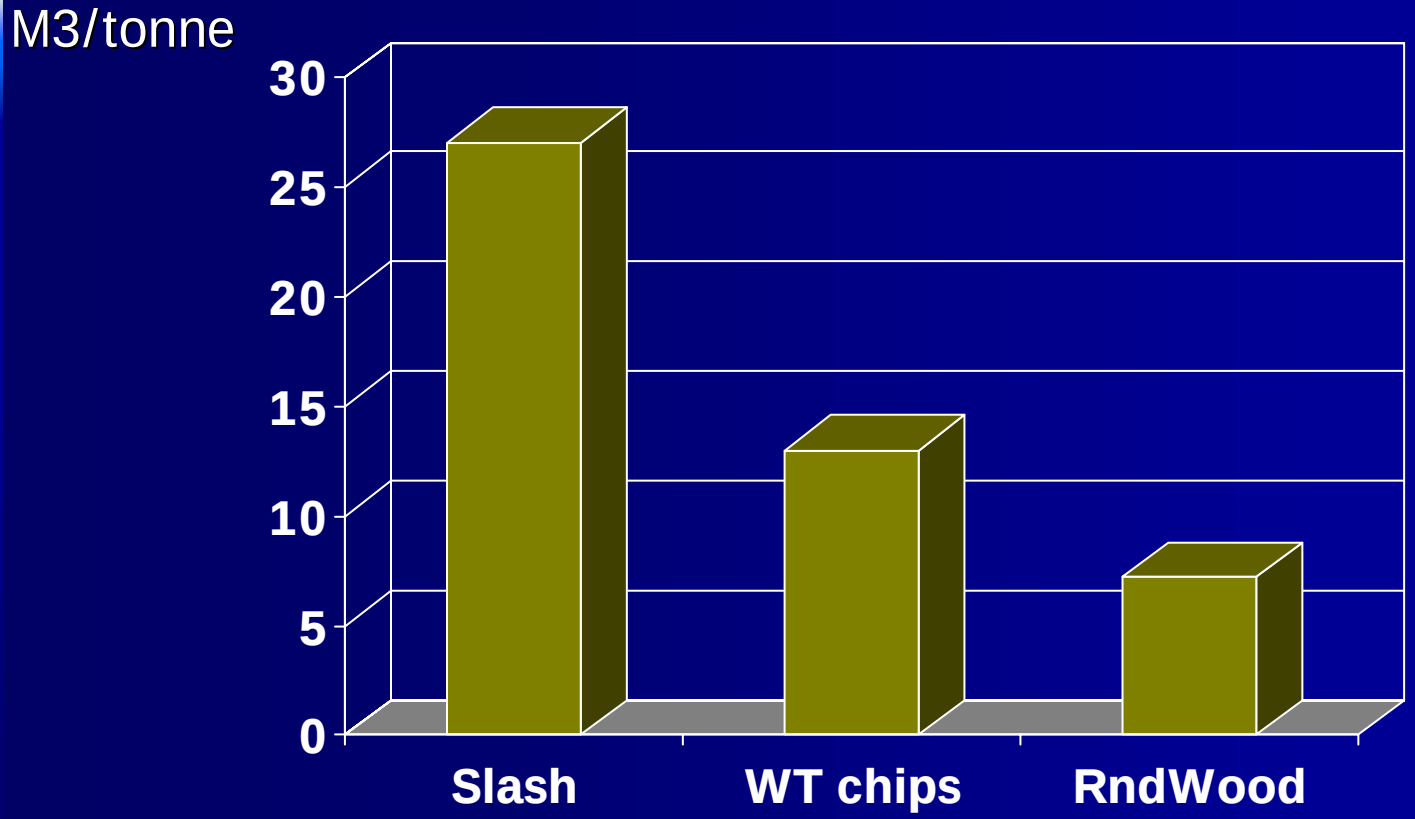
Managing healthy forests

What can we do with large volumes of small material?

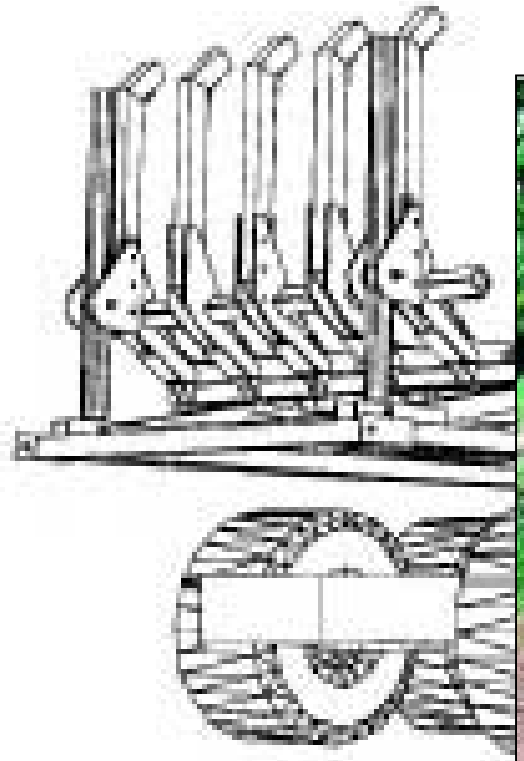
The Problem

- Cost of harvesting, handling, and transportation of small pieces
- Low-density
- Lots of pieces
- Low value
- Structural barriers

Density of biomass



Solution? Densify



Energy production

Valmet Woodpac

Timberjack 1490D

A Biomass Baler

Twine wraps

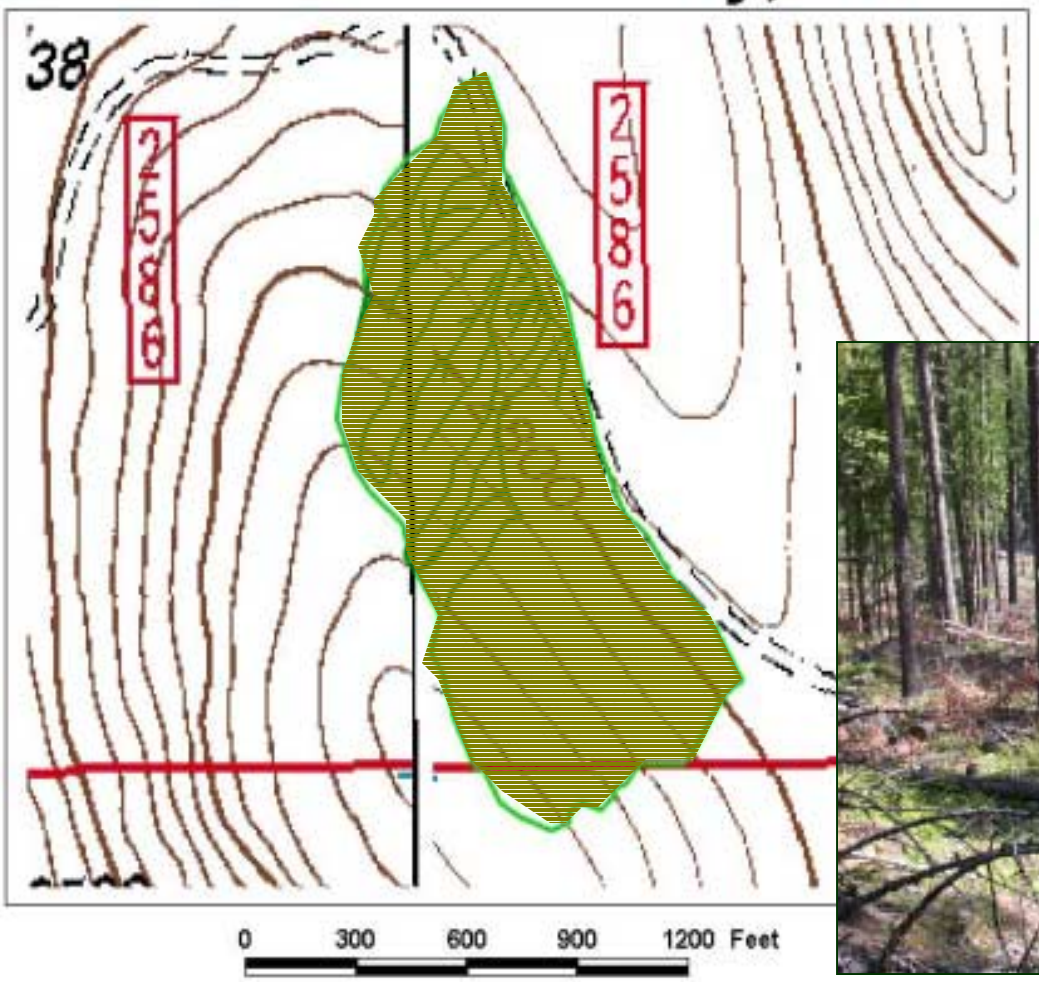

TMC

An integrated system

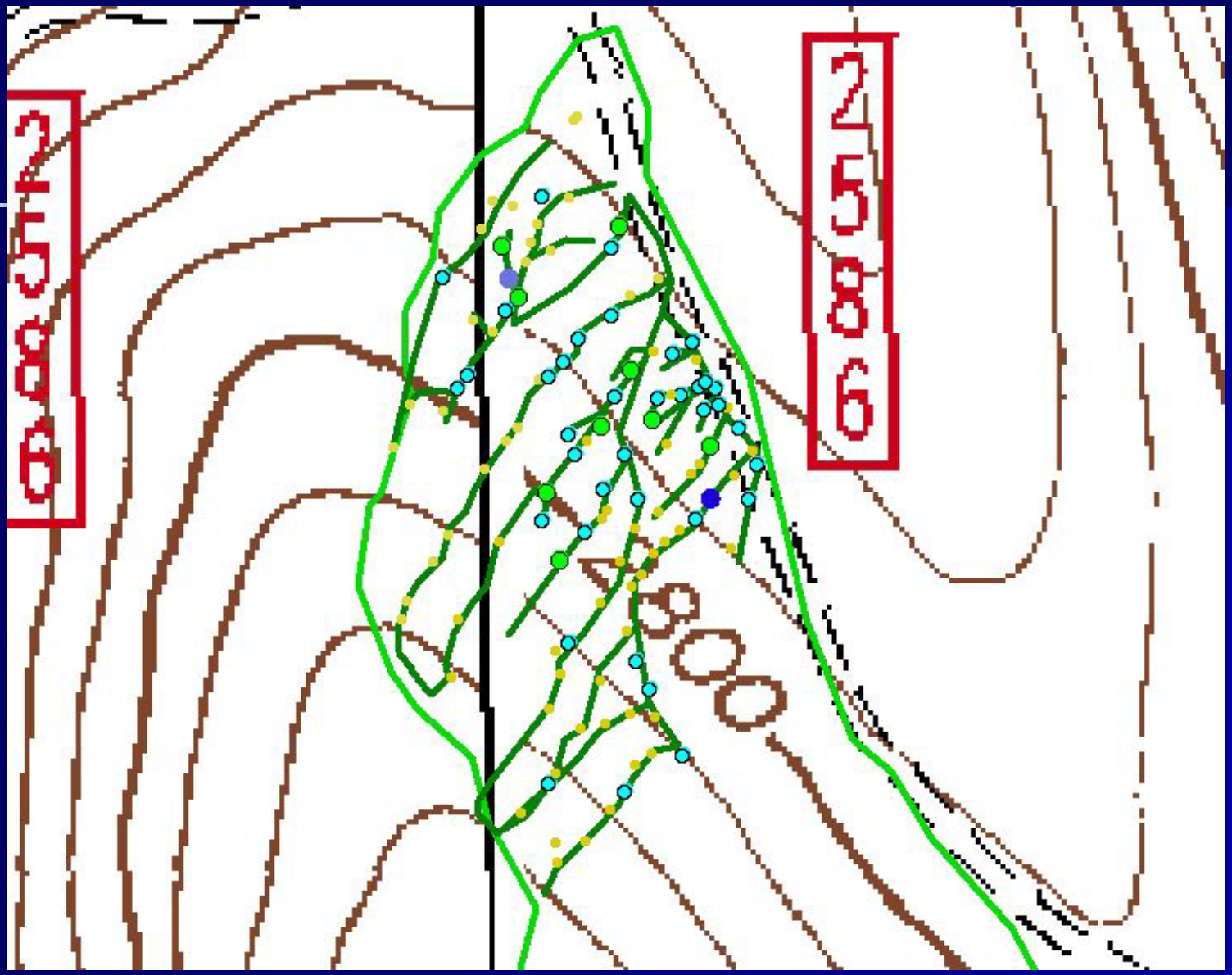
2003 Demonstration

- Timberjack, Natl Forests, BLM, FPL, S&PF, FS Research partners
- 7 sites
- Production, site impacts, performance
- Public demonstration
- Bundle samples

Bonners Ferry, Idaho

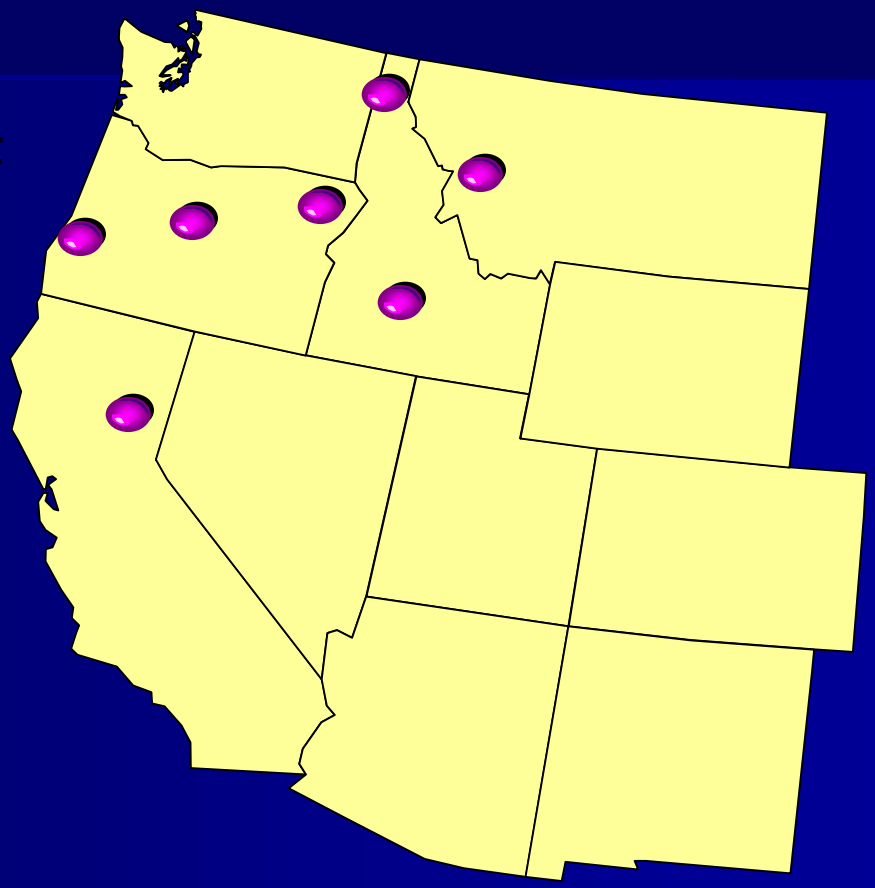


23 jun trails.shp
24 jun trails.shp
25 jun trails.shp
26 jun trails.shp
16 july poly nad.shp


6852
6852
4800

Sites

- Idaho Panhandle NF
- LaGrand, OR
- Boise NF
- Bitterroot Valley
- Medford, OR
- Eldorado NF
- Deschutes-Ochoco



Conditions

- Species
- Slash conditions
- Slash loading
- Slopes: 0 – 40%
- Previous operations
- Residual stand spacing

Idaho Panhandle NF

- 4-yr old slash
- Mixed conifer
- Slope to 40%
- Truck & Chip

Boise NF

- Ppine plantation
- Chainsaw
- Whole-tree
- Skidder

Bitterroot Valley

- WUI
- CTL
- Ppine thin
- chipped

Medford-BLM

- Mixed conifer
- CTL
- RO bins
- Log trucks

Eldorado NF

- Slash
- Landing piles

Deschutes-Ochoco NF

- Ppine
- Chainsaw
- Flat terrain

Crooked River NG

- juniper

2 acres of biomass

Transportation

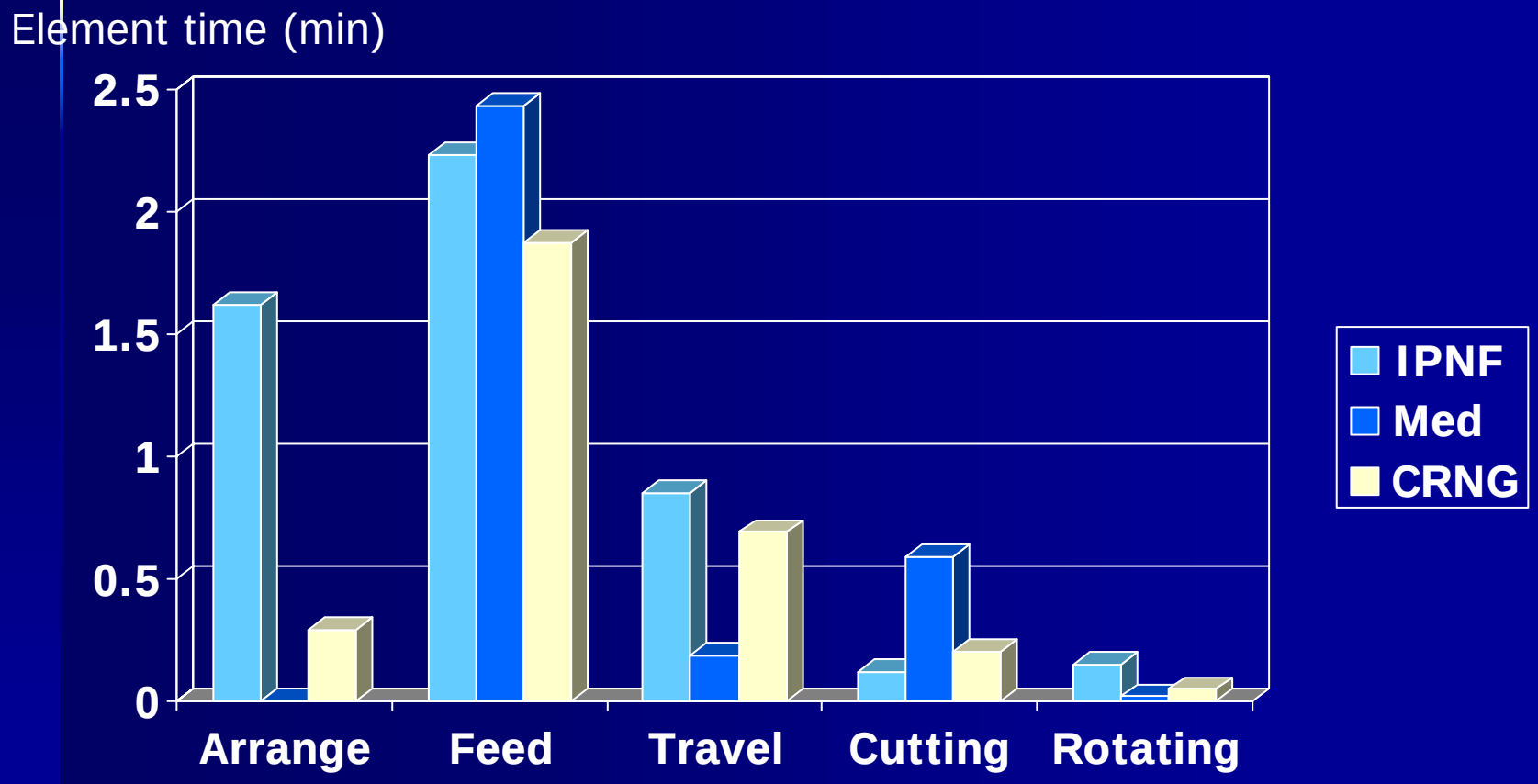
Utilization

Alternative uses

Results

	IPNF	BNF	BRV	Med	DO1	DO2	CRNG
Bundle length (ft)	14	10	14	10	15	*	10
Bundle weight (lb)	985	860	1176	772	1774	*	1000
Bdt removed/ac	12	20	*	12	7	16	*
Res stand (tpa)	142	54	61	70	56	137	Few
Bundles/hour	12	23	11	18	5	11	18

Work elements



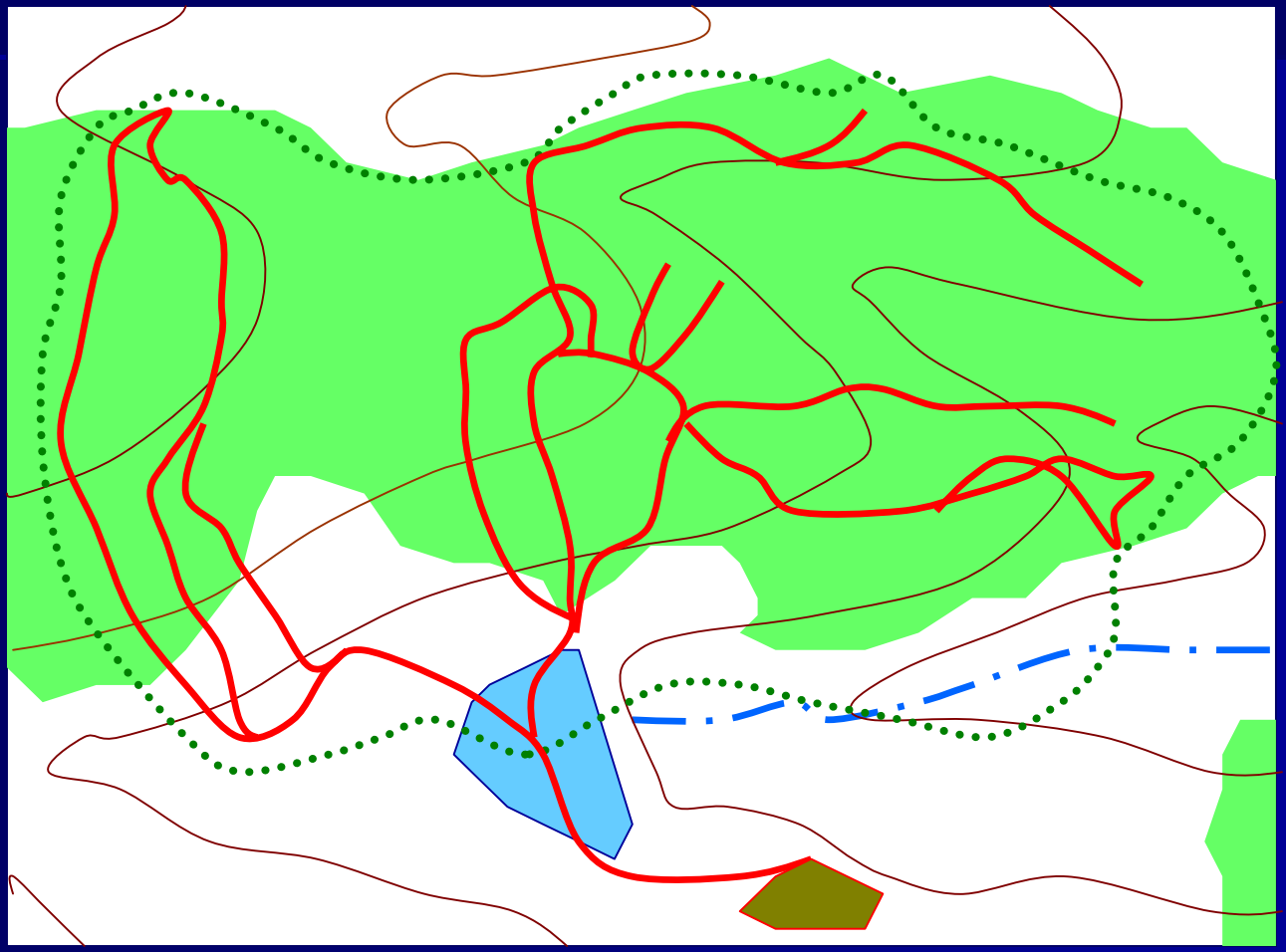
Key points

- Integrated system is necessary
  - Biomass arrangement critical
  - Type/condition of material
- Balance with extraction
- Thinning spacing affects productivity
- Able to work slopes
- Traffic on 10 – 15% of area (1 pass)
- Transportation issues

Slash arrangement ...

Residual spacing ...

Traffic spacing



Cost?

- $130/hour
- $10/bdt
- $5/bdt Forwarding
- $5-10/bdt Hauling
- $3/bdt Chipping

- $13/bdt (btu)

- $150/ac piling
- $300/ac burning

$23 - $28/bdt

Where would you bundle?

1. Harvest as much as you can
- Residue recovery with CTL operations
- Large percentage of biomass to merch
- Residue treatment separate from harvest
- Fuels treatment cost >$15/ton
- Low-impact, non-fire removals

Conclusion

- Biomass bundling worked
- Unique potential applications
- Viable tool if we consider value of treatment alternative